

Research Notes

Office of Research and Development

RN-06, April 1999

Coaching and the SAT® I

Each year well over one million students take the SAT® I as they prepare for the transition from high school to college. In hopes of increasing scores, many of these students and their parents struggle with the decision about whether to invest substantial amounts of time and money in commercial coaching programs.

Students and parents often hear anecdotal accounts of large score increases from friends, neighbors, or co-workers. Yet such individual examples do not provide a realistic indication of the average or typical effects of commercial coaching or of how another student might fare as a result of such coaching. Further complicating the decision are the claims of large score gains (and even guarantees) by some commercial coaching firms. On closer inspection, the reportedly high gains are computed using flawed research methods, and the “guarantees” may simply permit students to continue participating in coaching programs at no additional charge after initially paying a large fee.

To complicate matters, there has been little objective information about the possible benefits of coaching programs to help guide decisions by parents and students. Recently, however, a study sponsored by the College Board reexamined the effects of coaching on the SAT I (Powers and Rock, 1998). The investigators documented the test preparation strategies of a large sample of test takers. Then they contrasted the typical or average score gain on the test following participation in formal coaching programs (i.e., programs external to the high school and generally conducted by commercial companies) with the score gains of students not participating in

such programs. This paper describes both the results of this study and selected previous research on coaching for the SAT I. (The SAT I, an

enhanced revision of the former SAT, was introduced at the March 1, 1994 administration. Coaching studies that were conducted before that date refer to the original SAT and are so identified.)

COACHING PROGRAMS

Coaching programs differ in terms of methods, duration, and objectives. They may focus differentially on various elements (Allalouf & Ben-Shakhar, 1998):

- (1) familiarity with the test (e.g., getting acquainted with instructions, item types and format, time limits, and tools permitted, such as a calculator);
- (2) reviewing content relevant to a test (e.g., reviewing the content of the mathematical reasoning portion of a test); and
- (3) learning “tricks” or testwiseness skills, such as strategies for guessing, eliminating choices in multiple-choice questions, using time efficiently, and avoiding errors (Millman, Bishop, & Ebel, 1965).

Some programs emphasize the content of tests, while others stress quick tricks or testwiseness strategies. Jackson (1980) has noted that distinctions between short-term programs emphasizing drill and testwiseness and long-term programs that more closely resemble supplementary education should be distinguished when examining research on coaching. The College Board has asserted that familiarity with the test is important—no student should take the test “cold”—and most test takers seem to heed this advice. For instance, Powers (1998) reported that more than 97 percent of students prepared in some way before taking the SAT I, with a median of about 11 hours of preparation. Consistent with its advice, the College Board provides free of charge an explanation of test instructions, timing and test-taking strategies, a description of the content and format

KEYWORDS:

SAT I
Test Preparation
Coaching



The College Board
Educational Excellence for All Students

of items, and a sample test to all students registering to take the SAT I.

In addition to test familiarization activities, some test takers undertake much more extensive preparation. For instance, Schwartz (1999) described an intensive yearlong tutoring program that “isn’t so much teaching the test as simply teaching—in this case, intensive tutorials in math or reading” (p. 56). Reportedly, this program has resulted in large score gains on the SAT I. The assertions are based largely on anecdotal reports instead of formal research. Such programs, which extend well over a year in duration, differ from more popular test preparation programs, as they focus much more heavily on content that is relevant not only to the test, but also to education and learning. Such instruction may come at a very high price (fees of \$415 per session were reported by Schwartz).

The College Board (1999) has acknowledged that such long-term, intensive preparation that resembles genuine education may improve reasoning skills that are both measured by the SAT I and required for success in college. While no controlled research study has yet examined the effects of such intensive tutoring programs, the College Board has maintained that students’ math and verbal reasoning skills (and their SAT I scores) can improve as a result of rigorous academic study and other efforts (both in school and out of school). In evaluating the effects of coaching programs on test scores, the duration of the program and the focus of the program should be considered.

Formal, commercial test preparation programs tend to emphasize score increases, while short-term in-school programs and workshops appear to focus primarily on familiarity with the test. Increasing student confidence and reducing anxiety are also common across most forms of test preparation.

HOW THE RIGOR AND DESIGN OF COACHING STUDIES AFFECT THE RESULTS

In 1990, Becker identified nearly 50 studies of the effects of coaching for the SAT, and nearly a dozen additional studies have been conducted since that time. Studies of coaching differ in a number of

important areas, making results across studies difficult to compare. Many of the differences found in studies examining the effects of coaching on the SAT “relate less to the nature of the coaching intervention and more to the (quality) of the coaching research itself” (Becker, 1990, p. 376). Examining methodological differences among coaching studies can help to explain their discrepant results.

- Uncontrolled studies examine the score changes only for students who have attended test preparation programs. No effort is made to examine score gains for comparable students not attending coaching programs. DerSimonian and Laird (1983) noted that mean gains from such studies are about 40 for SAT Verbal and 50 points for Math scores. In such studies, any test score gain, even from a test taken up to two years earlier, is assumed to result solely from the coaching programs. Nearly all reports from commercial and formal test preparation programs are based on such simple score gains of students completing their programs. Sometimes the selective reporting of results also seems to be a factor. Several researchers have attempted to improve upon such studies by subtracting the typical gain for all repeat test takers (e.g., Slack & Porter, 1980). However, this strategy does not adequately control for differences between coached and uncoached test takers. These uncontrolled differences, and not the results of being coached, may explain any apparent effects of coaching. Such studies represent the least rigorous evaluations of the effects of coaching.
- At a minimum, controlled studies examine score gains for a second group of students who did not enroll in formal coaching programs. The effect of coaching is defined as the *difference* between the improvement made by coached and uncoached (control) groups. For more precise estimates, some studies employ matched or randomized groups in a further attempt to minimize any differences (e.g., grades, prior test scores, ethnicity, family income, and education) between students in the coached and uncoached groups, thereby rendering the groups as comparable as possible. Such

TABLE 1
MEAN COACHING EFFECT ON THE SAT BY QUALITY OF COACHING STUDY

Study design	Mean (standard error) effect on SAT Verbal	Mean (standard error) effect on SAT Math
Uncontrolled, single-group studies	40.6 (10.1)	53.8 (2.6)
Controlled studies	15.3 (5.5)	15.6 (2.6)
Randomized or matched groups	10.1 (3.5)	9.8 (3.8)

studies are considered to be the most rigorous and objective evaluation of coaching's potential effects (Becker, 1990; Powers, 1993).

- Meta-analysis is an analytic technique that enables researchers to examine the effects across a large number of individual studies that are often noncomparable due to differences in designs, samples, and conditions. This technique permits integration or synthesis to examine noncomparable studies and provides the most powerful estimate of the effects of coaching. Four such meta-analyses have been conducted on SAT test preparation programs.

Several consistent findings emerge from previous research. First, the effects of coaching programs are four to five times greater in studies that do not include a control group than in controlled scientific studies. Results from DerSimonian and Laird (1983) are illustrated in Table 1 and demonstrate that more rigorous and controlled studies show substantially smaller effects from coaching. The use of a control group is a standard practice in scientific studies in fields as diverse as medicine, finance, and education.

The importance of employing a control or comparison group can be easily illustrated. For example, an unpublished study at Deerfield Academy in Massachusetts (Franker, 1986-87) found that 19 students completing a commercial test preparation course increased their total SAT scores by an average of 80 points. This "effect" of coaching was identical to the average gain for 119 *uncoached* students at Deerfield. If a comparison group had not been used in this study, the increase of 80 points would have appeared quite impressive. When the score increases for students not attending formal test preparation courses are also considered, the effects of test preparation are

usually reduced dramatically.

To date, commercial coaching firms have documented their claims of large score increases mostly through uncontrolled single-group surveys of students completing their programs. Although sometimes verified by accounting firms, such surveys do not include control groups, have not been published in peer-reviewed journals, and do not constitute credible scientific studies (Powers and Rock, 1998). In many of these studies, the pre-test is not even an actual operational form of the SAT I or PSAT/NMSQT, but rather either a "facsimile" or a retired form of the SAT I administered under nonoperational conditions. Estimating score gain from an initial test that is not operational is a major flaw because students are less likely to be motivated and test-taking conditions are likely to be substantially different from operational administrations. Less effort and motivation are likely to result in much lower initial scores than an actual test administration and therefore inaccurately high estimates of score increases.

TEST PREPARATION TODAY

Powers (1998) reports that in 1995-96, students spent an average of 11 hours in preparation for the SAT I, an increase of one hour in the past nine years. At the extremes, 3 percent devoted no time to test preparation, and about half of the students spent no money on it, while 10 percent spent at least 54 hours and over \$135. The 12 percent of students attending external coaching programs spent the most money on test preparation activities.

Taking the PSAT/NMSQT was the most frequent form of test preparation (81 percent), with reading and completing the sample test in the free booklet provided by the College Board, *Taking the SAT I*, cited by over half of students

preparing for the SAT I. About 40 percent of students reviewed math books and 33 percent reviewed English books or vocabulary in preparation for the test, and about one third of all respondents received preparation for the SAT I as part of their regular classroom instruction. Similarly, one third of students purchased test preparation books and nearly 20 percent purchased software. While 12 percent of students attended coaching programs in 1995-96, 10 percent of students did so in 1992 and 11 percent in 1986-87. Similarly, between 5 percent and 7 percent of students reported attending private tutoring in surveys completed between 1986 and 1996. The only significant departures appear to be an increase in the use of test preparation software in recent years and a decrease in the number of students reviewing English books or vocabulary on their own.

STUDYING COACHING ON THE NEW SAT I

Powers and Rock (1998) conducted the first study of the effects of formal and out-of-school coaching programs on the new SAT I. They surveyed a stratified random sample of juniors and seniors who had registered for the SAT I in 1995-96. The approximately 4,200 students who responded to the surveys (63 percent of the sample) were representative of the larger college-bound population of test takers (Powers, 1998). A total of 507 students (12 percent) reported attending an out-of-school coaching program, with 220 students attending a program conducted by one of the two major national test preparation firms, with an additional 287 students attending programs conducted by other firms or organizations.

Only those students who first completed an actual administration of the PSAT/NMSQT or SAT I prior to attending the formal external coaching program and then taking (or retaking) the SAT I were included in the “coaching group.”¹ Similarly, the students in the uncoached group, who served as the control group, also completed a PSAT/NMSQT or SAT I during the same period of time and then took (or retook) the SAT I. This constituted a controlled study, and it was the difference between the score gains for each group

that best represented the additional boost or gain associated with coaching.

COACHED STUDENTS DIFFER FROM OTHER STUDENTS IN A NUMBER OF WAYS

Students who enroll in formal external coaching programs tend to differ from uncoached students in a number of ways, several of which are also related to performance on the SAT I. Table 2 reveals that coached students are more likely to:

- come from families with more formal education and higher income
- report their ethnicity as Asian American
- have higher degree aspirations
- have taken slightly more high school courses in math, science, and foreign language
- aspire to more competitive colleges (higher mean SAT I scores among applicants)

Coached students are also more likely to engage in multiple test preparation strategies than uncoached students. Again, Table 2 illustrates that twice as many coached students purchased the College Board’s *Real SATs* or other test preparation books, received private tutoring, and used study aids in preparation for the SAT I. Coached students were also more likely to use test preparation software, receive some SAT I preparation in high school classes, and have taken the tests (PSAT/NMSQT and SAT I) before. Overall, students attending external coaching programs were more likely to engage in nearly all forms of test preparation, some at twice the rate, than students who did not enroll in such formal programs. Coached students were also much less likely to regard their earlier test scores as good estimates of their abilities, and they indicated that good scores on the SAT I were of more importance to them than uncoached students did.

The substantial differences in many of these descriptive and demographic categories between the groups of coached and uncoached students were a concern to Powers and Rock (1998), as some of these characteristics could potentially affect estimates of the effects of coaching. Students who did not enroll in external coaching programs prepared for the test in different ways.

¹That is, to examine the effects of external coaching programs, students first must have taken the PSAT/NMSQT or SAT I (which could provide baseline data on their performance) prior to coaching, and subsequently take the SAT I following coaching.

TABLE 2
PERCENTAGE OF COACHED AND UNCOACHED STUDENTS AND DIFFERENCES IN
DEMOGRAPHIC AND BACKGROUND CHARACTERISTICS *

Characteristic	Coached Students	Uncoached Students	χ^2
Female	59	59	0.0
Ethnicity			89.7**
Asian American	21	8	
African American	11	9	
Hispanic	6	8	
White	58	72	
Other Minority	5	4	
English Best Language	95	98	18.2**
Father's Education			116.2**
High school or less	13	26	
Some college, associate's or bachelor's degree	40	49	
Some graduate school or degree	47	25	
Mother's Education			89.6**
High school or less	18	31	
Some college, associate's or bachelor's degree	49	51	
Some graduate school or degree	34	18	
Parents' Income			156.0**
Less than \$40,000	23	39	
\$40,000–\$80,000	34	43	
Above \$80,000	43	18	
High School Grade-Point Average			25.2**
A average	46	41	
B average	45	48	
C average	9	11	
Degree Goal			36.2**
Bachelor's degree or less	15	25	
Master's or higher	69	55	
Undecided	16	20	
Test Preparation			
Read <i>Taking the SAT I</i>	57	58	0.4
Tried sample test	51	51	0.1
Got College Board's <i>Real SATs</i>	21	9	81.2**
Got College Board's <i>Intro. New SAT I</i>	9	6	11.7**
Got College Board's video, <i>Inside the SAT I</i>	2	2	0.3
Got other test prep books	62	28	239.9**
Got special SAT I prep in high school class	39	32	9.3**
Attended special prep given by school	19	18	0.5
Tutored privately	15	5	75.0**
Used test prep software	26	18	18.8**
Used study aids	49	21	186.5**
Accessed test prep online	2	1	1.8
Used videos or related resources	2	2	0.0
Reviewed materials from math courses on own	35	39	3.6
Reviewed materials from English courses on own	30	33	1.9
Previously took PSAT/NMSQT	88	80	18.3**
Previously took SAT I	73	54	73.2**
Other	16	12	7.3**
Perception of Previous SAT I or PSAT Score			45.7**
Pretty good estimate of my abilities	20	32	
Somewhat too low compared with my abilities	54	50	
Much too low compared with my abilities	26	18	
Nervousness Taking the Most Recent SAT I			34.9**
Extremely or Very Nervous	35	23	
Somewhat Nervous	31	29	
Slightly Nervous or Not Nervous	33	47	
Importance of Good SAT Scores			29.8**
Extremely Important	52	40	
Very Important	37	41	
Somewhat Important	10	17	
Slightly Important or Not Important	1	3	

Note: For coached examinees, *ns* ranged from 397 to 534 for questions. For uncoached examinees, comparable *ns* ranged from 2,782 to 3,733.
* Adapted from Powers and Rock (1998).
** $p < .01$.

However, one concern was that students who did not enroll in formal external coaching programs would be more likely to attend school-based test preparation classes or workshops, receive preparation in school classes, and use private tutors, software, or test preparation books. This would make comparisons between groups and estimates of score increases more difficult. On the contrary, Table 2 illustrates that coached students, on average, engaged in other test preparation activities more frequently than did uncoached students. Therefore, when comparing raw score gains on the SAT I between both groups, any residual gain for coached students could also be partly explained by their propensity to devote more time to other test preparation activities, such as software, tutors, and test preparation books, as opposed to attributing the total residual gain to coaching alone.

While randomized groups of students were not used in this study, several different analytic methods, including methods to match comparable students, were used to estimate the effects of coaching on SAT I scores. Each of the methods controlled in slightly different ways for preexisting differences between coached and uncoached test takers. These analytic procedures are generally preferable and more feasible for coaching studies than are randomized groups.

A simple comparison between the score gains for the groups was also made to establish a baseline. Other methods attempted to control for differences between groups (e.g., parental educa-

tion and income, degree aspirations, and earlier test scores) that could also affect the latter SAT I scores for groups. Still other methods attempted to match cases or control for selection bias between groups in different ways. More detailed explanations of these analyses and their rationale are provided in Powers and Rock (1998). Here, we summarize results across these analyses, placing greater emphasis on the simpler models.²

EFFECTS OF COACHING ON THE SAT I

Table 3 illustrates the raw score differences between groups attending external coaching programs and other students. Coached students showed a 29-point gain on the verbal score, as opposed to a 21-point gain for uncoached students. In math, the gains are 40 points and 22 points, respectively, for coached and uncoached groups. As discussed earlier, the effect of a coaching program on SAT I score increases is not simply the average increase between admission tests completed prior to and then subsequent to a coaching program. Computing such score gains, as often done by coaching firms, is flawed because it doesn't consider the average growth for comparable students attributable to student development, maturation, educational experiences both in and out of school, increased familiarity with the test, and error. However, when examining score gains for coached students alone, the 29- and 40-point gains are much smaller

TABLE 3 MEAN PRE-SAT I, POST-SAT I, AND GAIN SCORES (AND STANDARD DEVIATIONS) FOR COACHED AND UNCOACHED EXAMINEES *				
Group	Pre-SAT I	Post-SAT I	Gain	Coaching Effect
Verbal				
Coached (n=427)	500 (92)	529 (97)	29 (59)	29 - 21 = 8
Uncoached (n= 2,733)	506 (101)	527 (101)	21 (52)	—
Math				
Coached (n=427)	521 (100)	561 (100)	40 (58)	40 - 22 = 18
Uncoached (n=2,733)	505 (101)	527 (101)	22 (50)	—
* Adapted from Powers and Rock (1998).				

² The Repeated Measures design only adjusts for differences in initial test scores between groups, and the Analysis of Covariance statistically controls for between-group differences on nine variables, including initial test scores.

than claims by national test preparation firms.

When the score gains for coached and uncoached groups are compared, the estimated effect of coaching is 8 points on verbal and 18 points on math. This residual gain (subtracting the gain for one group from the gain for the second group) does not control for the differences between groups in various characteristics shown in Table 2, which can also affect score gain.

The effects of coaching were estimated based on raw score differences, as noted above, as well as with six additional statistical models. Table 4 illustrates the effects of raw scores, repeated measures, and analysis of covariance designs (see Powers and Rock, 1998, for full explanation and estimates for other statistical models). The effect of coaching is fairly consistent across all of the analysis models, with a median effect of 8 points for verbal scores and 18 points for math.

The various analysis models were expected to yield somewhat different results, yet the largest average effect for coaching found using any of these methods was 34 total points across both verbal and math scores. We can conclude that the typical effect of coaching, whether averaging across various models of analysis, using simple unadjusted raw score changes, or employing some adjustments as done in repeated measures or ANCOVA, is 8 points on SAT I Verbal, 18 points on SAT I Math, and a total of 26 points across both scores.

In addition, this study concluded:

- Coached students were slightly more likely to experience large score increases than were uncoached students. Twelve and 16 percent of coached students had increases of 100 points or more on verbal and math scores, respectively, compared with 8 percent for uncoached students (same percentage for

both math and verbal scores).

- About one third of all students actually had no gain or a loss when retesting. On the verbal scale, 36 percent of coached students and 37 percent of uncoached students had a score decrease or no increase when retesting. On the math scale, 28 percent of coached students had a decrease or no increase compared to 37 percent of uncoached students.
- Students attending one of the two largest coaching firms' preparation programs do fare better than students attending other external coaching programs, but again, the effects of coaching are still small. The typical gains for students attending these firms were 14 and 8 points on verbal scores and 11 and 34 points on math scores (with an average increase of 10 points on verbal, 22 points on math, and 43 points on combined verbal plus math for the two major test preparation firms).
- There are no significant differences in the effects of coaching on the basis of gender and race or ethnicity, and whether initial scores were high or low. Students with initially lower SAT I scores are more likely to experience large increases than were students with initially higher SAT I scores for statistical reasons. However, the effects of coaching remain constant across students at all initial score levels after controlling for the typical score gains achieved by students.
- The revised SAT I is no more coachable than the previous SAT.

DISCUSSION AND CONCLUSIONS

Results from Powers and Rock (1998) are quite consistent with nearly all published research on

TABLE 4
EFFECTS OF COACHING BASED ON ALTERNATIVE MODELS OF ANALYSIS *

Analysis Model	SAT I Verbal Mean Effect / Standard Error	SAT I Math Mean Effect / Standard Error
Raw Score (n = 427)	8 (3)	18 (3)
Repeated Measures (n = 427)	8 (3)	18 (3)
ANCOVA (n = 235)	6 (4)	18 (3)

* Adapted from Powers and Rock (1998).

the effects of coaching and especially consistent with results from meta-analyses and controlled studies. A summary of findings from the four meta-analyses of the SAT estimated similar mean effects for coaching:

- In the most recent and comprehensive meta-analysis, Becker (1990) estimated a gain of 9 points on the SAT Verbal score and 19 points on the SAT Math scale, using studies with comparison groups.
- Kulik, Bangert-Drowns, and Kulik (1984) examined only coaching programs that explicated instructed test taking strategies (rather than those focused primarily on teaching content) and reported coaching effects of approximately 15 to 16 points for verbal and math sections of the SAT.
- Results from DerSimonian and Laird (1983) are reported in Table 1. Using studies employing a comparison group, average effects for coaching are 15 points on verbal and math scores.
- The study by Messick and Jungeblut (1981) estimated a mean coaching effect of 14 points on SAT Verbal scores and 15 points on SAT Math scores using controlled studies.

The exact effect of test preparation for the SAT and SAT I cannot be stated unequivocally. However, results across four meta-analyses, over two dozen controlled studies, and the most recent controlled study by Powers and Rock (1998) suggest that formal test preparation programs are likely to result in an increase of between 9 and 15 points on the verbal scale and 15 and 18 points on the math scale. Larger score gains are usually found in math than in verbal. These figures are increases attributed to coaching that are beyond the average increase found across groups of students who did not attend formal coaching programs.

A number of other additional conclusions can be inferred from the body of research examining the effects of coaching on the SAT and SAT I:

- The quality of the study, whether a single pre- or post-test gain is computed for students receiving test preparation, or whether more scientifically rigorous methods are used, will have a substantial impact on the findings. The more rigorous the study, the smaller the effects; and exam-

ining simple score gain for coached students in a pre- or post-test design can be quite misleading.

- Longer coaching programs result in slightly larger score gains than shorter programs. After approximately three to nine hours, additional time devoted to formal test preparation appears to have diminishing returns.
- We are aware of no controlled research that has examined the effects of intensive and long-term tutoring or supplementary educational programs geared toward improving reasoning skills and content expertise. However, previous research has demonstrated that rigorous coursework and study can improve reasoning skills and performance on the test. A logical extension of this work would suggest that such long-term interventions, which more closely resemble rigorous and long-term academic study than commercial coaching programs that focus on tricks, strategies, or testwiseness, may increase students' academic skills and overall performance on tests that measure these skills.
- Students who enroll in formal coaching programs for the SAT I differ from other students in terms of their aspirations, satisfaction with their previous test scores, family background and income, and ethnicity. Such differences make simple comparisons between groups flawed.
- The effects of coaching on SAT scores are considerably smaller than the effects of coaching for other aptitude and achievement tests (research summarized in Powers, 1993).

SUMMARY

The relationship between coaching and subsequent performance on the SAT I is a complex issue. Overall, anecdotal reports from one or two students and even studies that gauge the effects of coaching by examining the score gains for students who have enrolled in these programs are highly misleading and will not present an accurate picture of the true effects of coaching.

Collectively, these studies indicate that coaching does have some benefit. However, though consistent, the effect is small. A typical

student enrolling in a formal test preparation program can expect a total score gain of between 25 to 32 total points on the verbal and math sections beyond what they could expect to gain without attending such a program. The largest effect found across the meta-analyses or the various analytic methods employed in the most recent controlled study (Powers and Rock, 1998) would amount to about two to four more items correct on the 60-item math section and one to two additional items correct on the 78-item verbal section. Assuming that a typical external coaching program may cost over \$750 and require up to 40 hours of classroom instruction (and perhaps another 10 to 20 hours of homework assignments), students and parents should weigh carefully the decision to attend a coaching program against the benefits of devoting that time to other educationally relevant activities and extracurricular activities that are viewed as equally important for admission to, as well as eventual success in, college. A rigorous program of high school courses, along with familiarity with the content and format of the SAT I and practice on actual tests, can help students prepare for college and the SAT I.

The authors are Donald E. Powers, a principal research scientist at Educational Testing Service, and Wayne J. Camara, executive director of research and development at the College Board.

REFERENCES

- Allalouf, A., & Ben-Shakhar, G. (1998). The effect of coaching on the predictive validity of scholastic aptitude tests. *Journal of Educational Measurement*, 35, 31-47.
- Becker, B.J. (1990). Coaching for the Scholastic Aptitude Test: Further synthesis and appraisal. *Review of Educational Research*, 60, 373-417.
- College Board (1999). Personal communication.
- DerSimonian, R., & Laird, N. M. (1983). Evaluating the effect of coaching on SAT scores: A meta-analysis. *Harvard Educational Review*, 53, 1-15.
- Franker, G.A. (Winter, 1986-87). The Princeton Review reviewed. *The Newsletter*. Deerfield, MA: Deerfield Academy.
- Jackson, R. (1980). The Scholastic Aptitude Test: A response to Slack and Porter's "Critical Appraisal." *Harvard Educational Review*, 50, 338-391.
- Kulik, J. A., Bangert-Drowns, R. L., & Kulik, C. L. C. (1984). Effectiveness of coaching for aptitude tests. *Psychological Bulletin*, 95, 179-188.
- Messick, S. & Jungeblut, A. (1981). Time and method in coaching for the SAT. *Psychological Bulletin*, 89, 191-216.
- Millman, J., Bishop, C.H., & Ebel, R. (1965). An analysis of testwiseness. *Educational and Psychological Measurement*, 25, 707-726.
- Powers, D. E. (1993). Coaching for the SAT: A summary of the summaries and an update. *Educational Measurement: Issues and Practice*, 12, 24-39.
- Powers, D.E. & Rock, D.A. (1998). Effects of coaching on SAT I: Reasoning scores. *College Board Research Report 98-6*. New York, NY: College Board.
- Powers, D.E (1998). Preparing for the SAT I: Reasoning Test—An update. *College Board Research Report 98-5*. New York, NY: College Board.
- Schwartz, T. (January 10, 1999). The test under stress. *New York Times Magazine*. Pp. 30-35, 51, 56, 63.
- Slack, W.V. & Porter, D. (1980). The Scholastic Aptitude Test: A critical appraisal. *Harvard Educational Review*, 50, 154-175.

Copyright © 1999 by College Entrance Examination Board and Educational Testing Service. All rights reserved. College Board, SAT, and the acorn logo are registered trademarks of the College Entrance Examination Board.

Permission is hereby granted to any nonprofit organization or institution to reproduce this report in limited quantities for its own use, but not for sale, provided that the copyright notice be retained in all reproduced copies as it appears in this publication.

**For more information or additional copies of this report, please write to: Office of Research,
The College Board, 45 Columbus Avenue, New York, NY 10023-6992, or contact us by e-mail at:
research@collegeboard.org, or visit our Web site at: www.collegeboard.org.**

4/99
200271